

## Developing bauxite projects – balancing technical and logistical considerations

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### Abstract



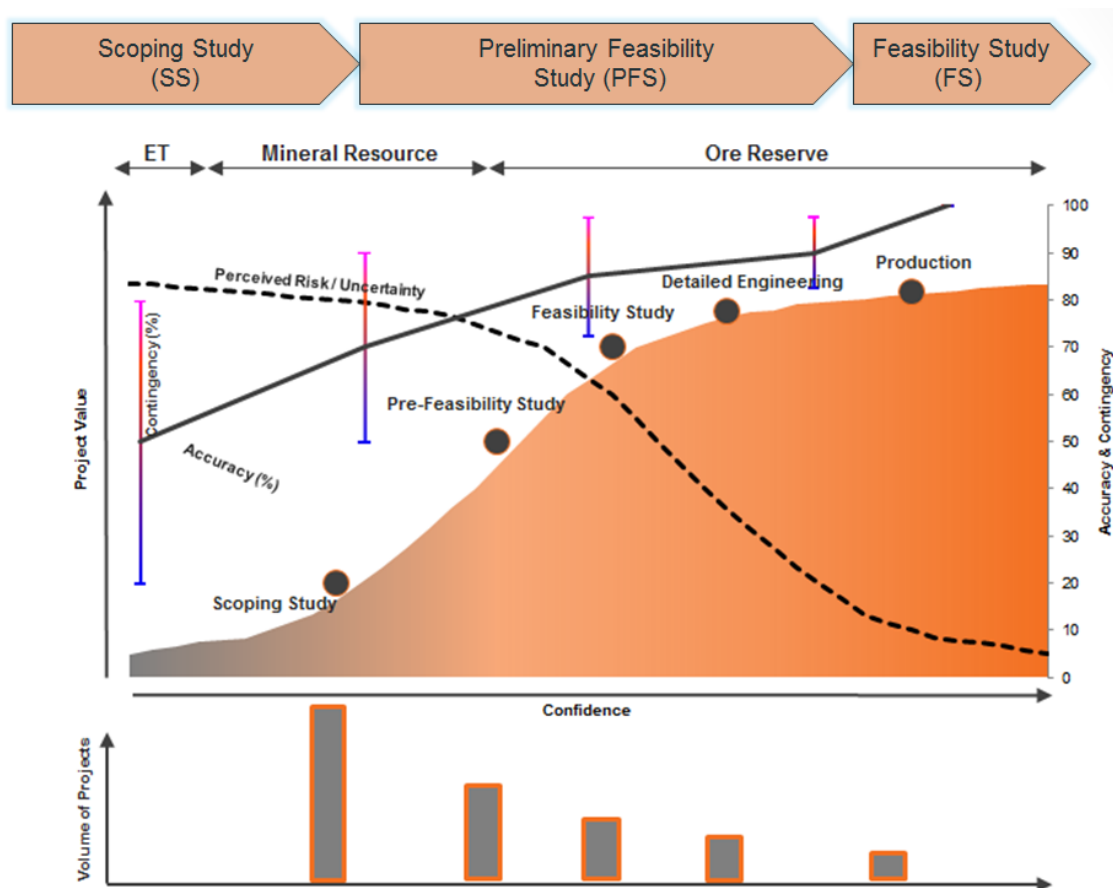
Bauxite projects around the world share many similar characteristics: a perceived understanding that the geology is relatively simple and that mining is straightforward; and also, many are located in remote areas that may require significant infrastructure solutions to bring the ore to a port or refinery. This paper sets out to explain the issues and provide an understanding of the competing pressures on where to focus effort when undertaking the technical evaluation of bauxite projects. Getting the balance right is making sure that sufficient geological exploration and resource evaluation are undertaken to appropriately characterize the deposit and allow an optimal mine plan to be developed, versus the logistical analysis and infrastructure design required to understand the capital and operating cost implications of bringing the bauxite to market. Bauxite resources are not particularly difficult to explore or exploit; however, because of the long distances from the deposit to the nearest port, construction of roads, railways, and barging solutions need to be considered and the capital for these solutions should not be underestimated. There is a risk that too much focus on logistics and infrastructure diverts attention away from the real issue of the quality and quantity of the resource proposed for exploitation.

**Keywords:** Bauxite exploration; bauxite mining; development; logistics; production.

### 1. Introduction

The aim of this paper is to discuss how to correctly bring a bauxite project through the different study levels without losing focus on the key drivers. At present, there are well developed international best practices as well as various international reporting codes which enable work to be progressed while maintaining the key features of transparency, materiality and competence.

A project development path (including various study levels as presented in Figure 1) is dependent on the individual company's or investor's approach driven by their specific objectives, timeframes, marketing etc. In both buoyant and stressed market conditions it is often attractive to fast track or skip a particular technical study stage (for example scoping or PFS). However, in order to do so it is always important for the company to understand both the opportunities (potentially reduced cost and timescale) and the risks (selection of a non-optimal solution, requirement to do rework, or, in the worst case, even project failure). In order to understand these risks it is imperative that the company assess each of the technical disciplines to identify where the risks lie and the potential probability and magnitude of the impacts. This paper aims to introduce the different technical disciplines, their relative importance and the potential risks and opportunities that are presented when considering a typical West African bauxite project at a scoping study level of development.



**Figure 1. Fundamentals of technical study levels.**

The SRK Group has an established track record in delivering technical studies and reports for the bauxite and alumina industry. Table 1 presents a summary of recent bauxite and alumina projects completed by SRK split by geography, asset and mandate type. In terms of the competent persons reports (CPR) and multidisciplinary studies, this would often include broad multidisciplinary assessment concluded with economic modeling to support the declaration of Ore Reserves. The nature of such multi-disciplinary consulting work very often leads our clients to choose SRK to ultimately manage the whole study process, benefitting from hosting all of the studies under one roof and an understanding of the interdisciplinary dependencies critical to managing the process efficiently. As a result, SRK has developed a robust understanding of the different decision points and projects phases, differing client requirements, reporting standards, permitting and regulatory requirements and overall market.

**Table 1. Bauxite Studies by SRK Consulting (UK) Ltd 2005 – 2015.**

Studies by Asset Location		Type of Studies and Operations	
India	1	<i>Mandates</i> ***	
Kazakhstan	2	MRE** or MRE Update	26
Italy	1	CPR* & Due Diligence	45
Greece	2	Multi - or Discipline Technical Study	35
Guinea	20	Ore Reserve Estimates	8
Jamaica	4	<i>Asset Type</i>	
Russia	2	Open Pit Mine	21
Guyana	1	Underground Mine	1
Saudi Arabia	1	Exploration Property	24

volume of historical geological information but it has reported in a way that is insufficient to satisfy current internationally recognised reporting standards. Once the geological situation has been clarified, subsequent technical considerations come into play.

Disciplines such as mining, hydrology and hydrogeology, infrastructure, geotechnics, environment and social have low to moderate influence and are often not significant to this type of project. Despite that, they should be properly assessed as otherwise there is a risk that the selected solutions or scenarios will not be optimal to the project.

At the end these are costs and economic outcome which decide the project's economic viability. The biggest focus in that regards is to the project logistics. It appears to be very common that more than 60 % of the total operational costs over the LoM are related to logistics. This demonstrates that logistics potentially have a huge economic impact on the project's economics and therefore all possible options should be considered to define the optimum scenario brought forward to more detailed studies.

So, what should be the most important areas to focus on in the early stages of developing a bauxite project? First of all, available options and scenarios should be defined with a clear set of assumptions. The assumptions will influence the level of confidence, which is typically high in that part of the process, but will be confirmed or eliminated in the subsequent studies. Obviously, without the bauxite mineral resource there can be no project. The fact that mining bauxite is usually relatively simple and cheap when compared to the overall cost should also not decrease its importance in the technical assessments carried out. On the other hand, the location and remoteness of a deposit can indeed act as a fatal flaw to the project because of the huge capital required to start production or the significant operating costs relating to the transportation of the product. Therefore, the answer to this question is probably somewhere in between. It will strongly depend on the situation specific to the individual project; but generally, based on SRK observations and experience, this paper reaches the following conclusions: Geology and logistics are the main big areas for consideration, especially for West African bauxite projects. Quality of the bauxite resource is critical, given the potentially large areas and volumes that are available in many deposits, and activities should be focused on understanding the portion of the deposit that is of the best quality and thickness to provide the Life of Mine feed for the project, rather than simply trying to define as big a tonnage as possible. Logistics play a major role in costs and economic analysis, and for very remote sites that require completely new infrastructure, logistics may be the controlling factor, but a comprehensive geological assessment and thorough assessment of the resource will still be needed in order to influence whether it worth undertaking extensive logistical and infrastructure assessments.

#### **4. References**

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